

Broadband Wireless Standards: What Systems Need to be Addressed and What Should be Standardized?

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Broadband Wireless Systems

Operating Frequency

- **Terrestrial**
 - 28 GHz LMDS
 - 38 GHz
 - 24 GHz
 - Others?
- **Stratospheric**
 - 28 GHz
 - 38 GHz
 - 48 GHz/V-band
- **Satellite**
 - GEO
 - 19/29 and V-band
 - LEO
 - 19/29 GHz

Broadband Wireless Systems

Common Characteristics

- Provide Two-Way Communications Capability
- Offer Capacities Comparable to Optical Fibers
- Deliver Multi-Media Services
- Incorporate Extensive Frequency Re-Use
- Share Bandwidth with Multiple Users
 - FDMA/TDMA/CDMA
- Support Various Protocols
 - MPEG-n, ATM, IP, Telephony, etc.
- Include Signaling and Access Control

Common Characteristics (cont.)

- Large Bandwidths
 - Hundreds of megahertz
 - Requires Wide-band, High-frequency IF
- Utilize Small, High-Gain Antennas
- Co-Exist with Other Systems
 - Same System, Different Manufacturers
 - LMDS-LMDS BTA Boundaries
 - Terrestrial/Stratospheric/Satellite
 - Satellite/Satellite
- Co-Exist with Different Waveforms in Space

Air Interface Compatibility Issues

Intersystem

- Antenna Characteristics
 - Beamwidth
 - Sidelobes
 - Polarization
- Power Spectral Density/EIRP
- Power Control
- Modulation
 - Robustness
 - Frequency Sidelobes/Adjacent Channel Interference
 - Spectral Efficiency
- Bandplan
- Duplex Implementation (FDD, TDD)

Air Interface Compatibility Issues

Intrasystem

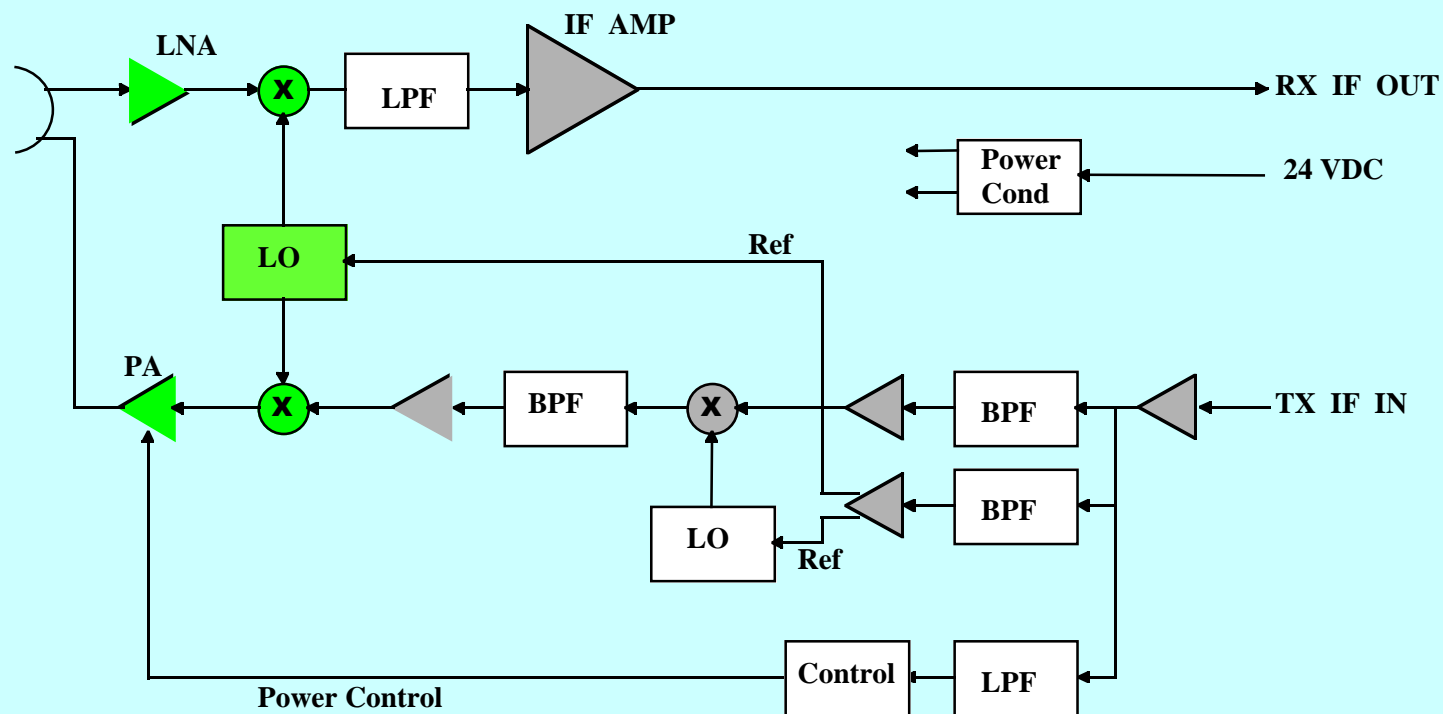
- All Intersystem Issues Plus:
 - Frequency Plan/Channel Plan/IF Frequency
 - IDU/ODU Interface
 - Modulation
 - Randomizer
 - Error Correction Coding
 - Message Structure/Format
 - MAC Layer and Signaling Protocol
 - Network Protocol (ATM, IP, MPEG, etc.)

Air Interface Compatibility Issues

Reference System Specification

- Purpose: *To guarantee compatibility and performance for specific systems.*
- Must address:
 - Intersystem & Intrasystem Issues plus:
 - Phase Noise Characteristics
 - Amplitude and Phase Characteristics
 - BER Performance
 - Specific Modulation and Error Correction Set
 - All timing, network protocols, algorithms and formats in detail

Generic Outdoor Unit Block Diagram



Summary

- Broadband Wireless Standards Should Address all Delivery Methods--Terrestrial, Stratospheric and Satellite.
 - Similar Needs
 - Possible Co-Share of Bands
- As a minimum, the Standards Activity Should Address *All Intersystem Issues*.
 - Insure reliable co-existence of various systems within the spectrum
 - Maximize the Use of the Spectrum for Multiple Purposes
- Should consider development of intersystem standards
 - Enhance Value of Spectrum for both end user and system operator.
 - Expedite System Deployment